

# Eclipse Series

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## **PS12 Power Supply** Operation and Maintenance Manual

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## **WARNING**

Specifications may vary from those given in this document in accordance with requirements of local authorities. RF Technology equipment is subject to continual improvement and RF Technology reserves the right to change performance and specification without further notice.

## **1 Overview**

The PS12 is an analogue power supply designed for use with the RF Technology “Eclipse” series of base station/repeater modules. The analogue supply offers higher reliability and reduced risk of interference through emissions than comparable switch mode supplies.

## **2 Operating Instructions**

The PS12 is available in both 110/120 and 220/240 Vac versions. The two versions are not simply interchangeable. The operating voltage is indicated on the front panel label, next to the fuse, and/or on the rear panel. (The labeling varies with different versions.)

### **2.1 Front Panel Controls and Indicators**

#### **2.1.1 Mains Switch**

The mains switch is a rocker switch on the front panel. When the switch is in the OFF position, the supply is completely removed from the mains supply (i.e. there is no keep-alive circuits on standby.)

#### **2.1.2 Fuse**

The mains safety fuse is accessible from the front panel. The rating of the fuse depends upon the line voltage, and is marked in the holder. The rating is 3A for 220-240Vac and 6A for 110-120Vac.

#### **2.1.3 PWR LED**

The PWR LED indicates that power is applied, that the fuse is intact, and the main switch is turned on.

### 2.1.4 I/T LED

The I/T LED indicates that the supply is either in current limiting or is overheating.

## 3 Specifications

### 3.1 Output Rating

The output voltage of the PS12 is designed to hold  $13.8\pm 0.4V$  for load currents between 100mA and 20A, for temperatures from 0 to 60C, and for line voltages of  $\pm 10\%$  of nominal.

#### 3.1.1 Load Regulation

Load regulation is better than  $\pm 0.05V$  for load currents from 100mA to 15A. Typical performance is 20mV from zero to full load at the connector.

#### 3.1.2 Ripple

Ripple is typically 5mV at 15A load.

### 3.2 Duty Cycle

The PS12 is rated for 20A at 100% duty cycle for temperatures up to 40C.

Peak current capability is  $>22A$  (typically 24A), provided the average current over any 3 minute period is kept to 20A.

Performance derates linearly to zero at 75C.

## 4 Circuit Description

The regulator is designed with twin secondary windings on a toroidal transformer with tight load regulation specifications. This allows the overhead voltage to be kept to a minimum, and the efficiency relatively high for an analogue supply. Each secondary has its own bridge rectifier. The main smoothing capacitor is common.

### 4.1 Regulator PCB

The regulator is a series-pass design. Q1 and Q2 are configured as a parallel pair of common-emitter amplifiers to deliver the smallest possible overhead voltage consistent with active regulation. R6/R7 ensure current sharing between the two pass transistors, and allow current sensing.

Q5 acts as the driver transistor, supplying base current to the main regulator pair. Q6 is configured as a current bleed to start the regulator by providing base current to Q5, which in turn supplies current to Q1/Q2. When the output voltage rises to the level preset by D6 and RV1, Q3 turns on, shunting the bleed current and supply current for

Q5. this reduces the drive to the series pass elements Q1 and Q2, effecting regulation. C3/R12 compensates the feedback loop.

Q4 acts as a current limit transistor. If the load current rises sufficiently to drop more than about 1.2V across R6 and R7, Q4 turns on shunting the base current from Q1/Q2 and limiting the output current. Q7 illuminates the warning LED.

Q8 and RT1 sense heatsink temperature, and indicate an over-temperature condition. R26 illuminates the power LED from the output supply.

## **5 Connectors**

### **5.1 Power Connector**

Power is available via the 25-pin “D” Male connector mounted on the rear panel.

### **5.2 Mains Connector**

The line supply is connected via a standard IEC 3-pin main connector mounted on the rear panel.

## **A Engineering Diagrams**

### **A.1 Block Diagram**

Figure 1 shows the block layout of the supply, and details wiring not contained on the main printed circuit board, such as the mains wiring.

### **A.2 Circuit Diagrams**

Figure 2 shows the detailed circuit diagram with the component numbers and values for the PCB.

### **A.3 Component Overlay Diagrams**

Figure 3 shows the PCB overlay guide with component positions.

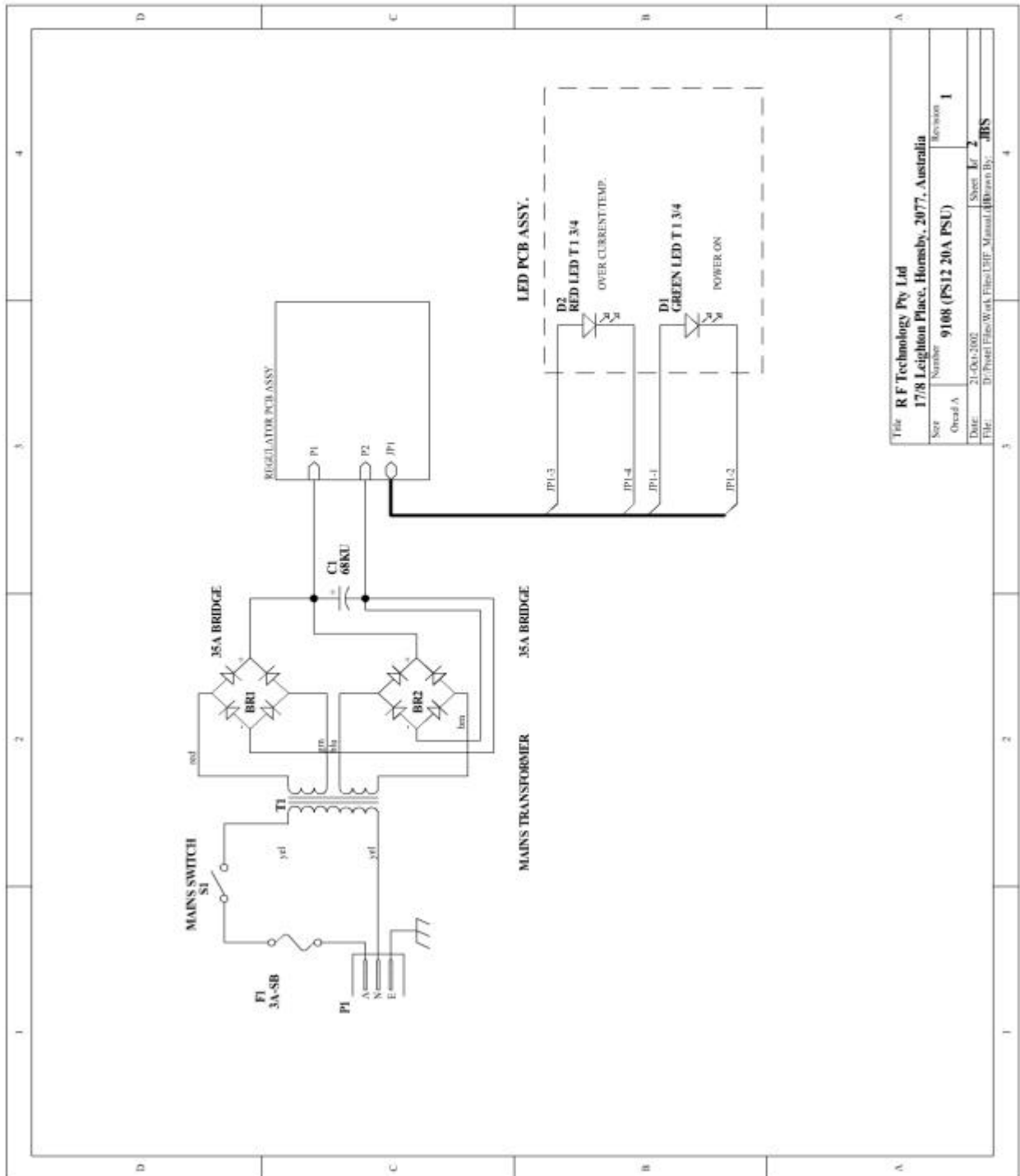


Figure 1: The block circuit diagram.

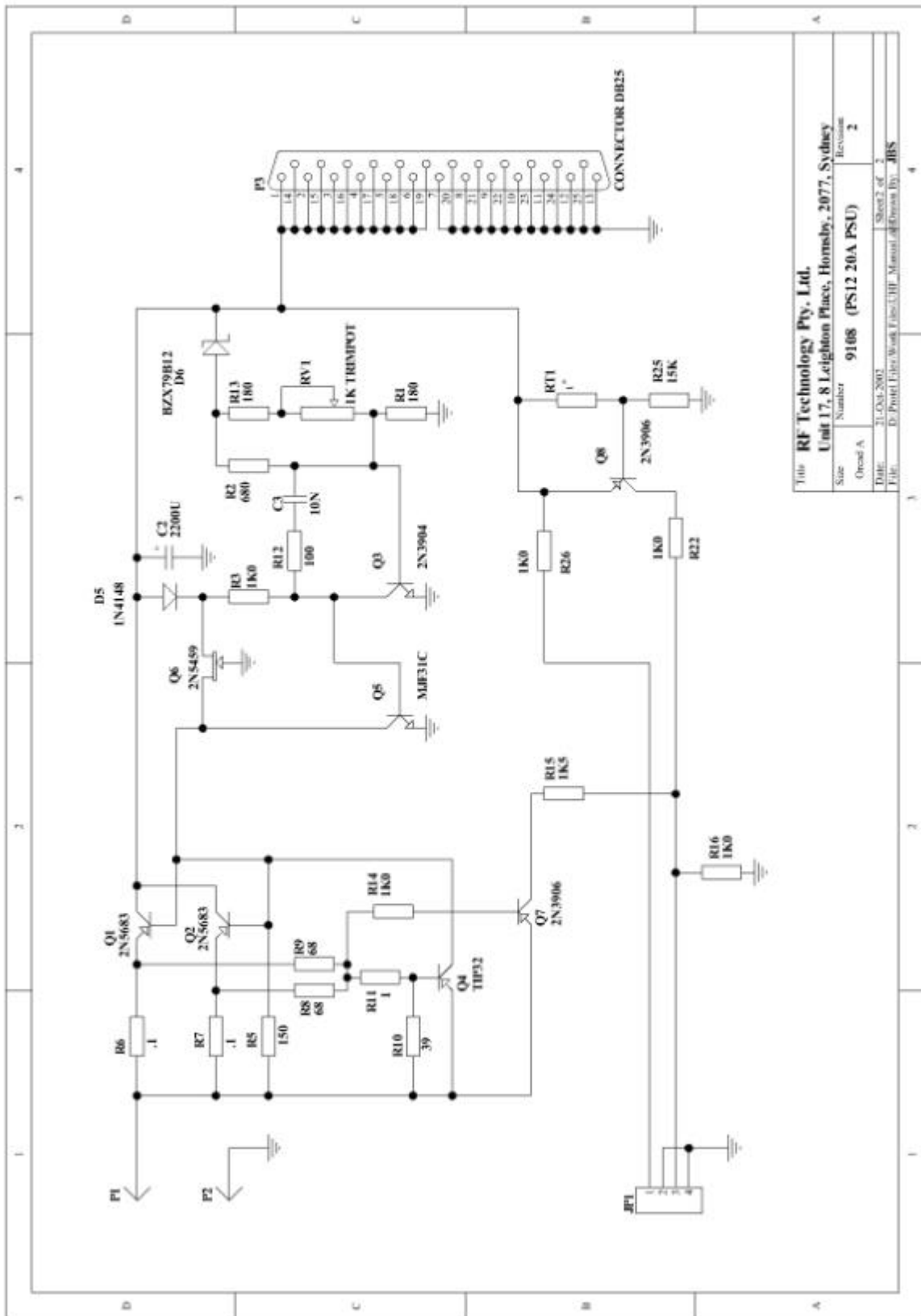


Figure 2: The component circuit diagram of the 9108 power supply.



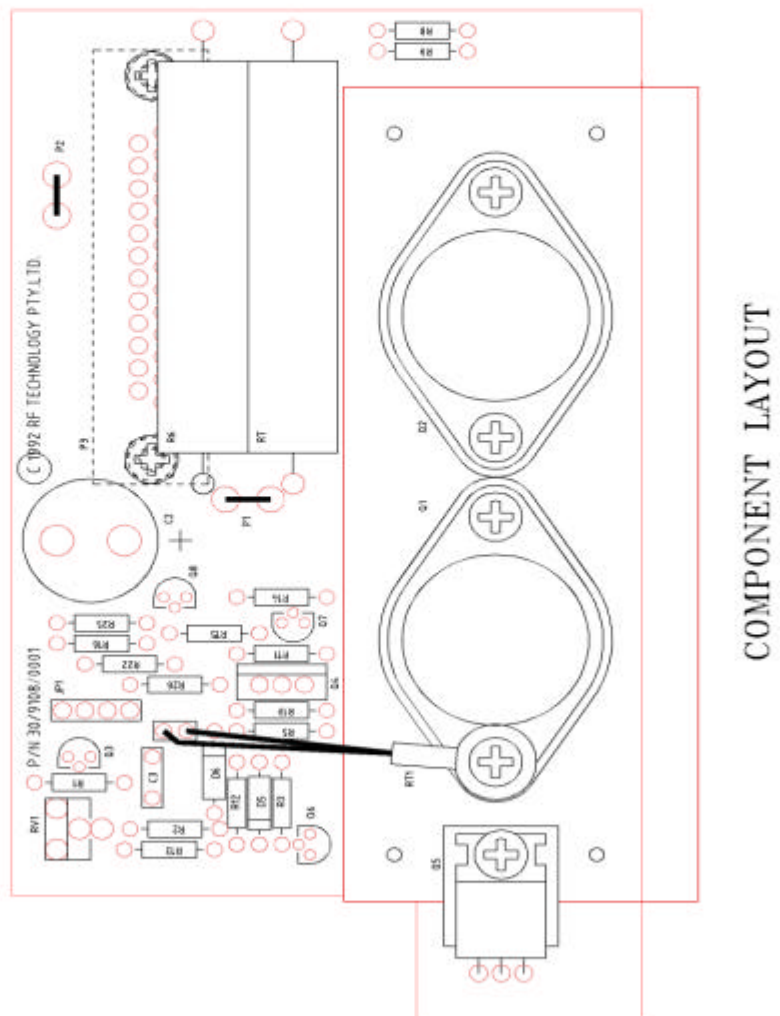


Figure 3: The printed circuit board component overlay diagram.

**B - Parts List for PS12 Power Supply**

<u>Ref.</u>	<u>Description</u>	<u>Part Number</u>
BR1	BR RECT 35A 400V	21/1090/3504
BR2	BR RECT 35A 400V	21/1090/3504
C1	CAP 68KU 40V 65x105 CAN	41/2140/68KU
C2	CAP 2200U 25V RB ELECTRO	41/2001/2200
C3	CAP 10N 10% 50V X7R RAD.	46/2001/010N
D1	DIODE LED GREEN T1 3/4	21/1011/LEDG
D2	DIODE LED RED T1 3/4	21/1011/LEDR
D3	DIODE LED RED T1 3/4	21/1011/LEDR
D5	DIODE SILICON IN4148	21/1010/4148
D6	DIODE 12V ZENER BZX78B12	21/1040/0B12
F1	FUSE 20x5 3A ANTI-SURGE	39/1120/AS3A
F1H	FUSE HOLDER (20x5)PNL MT	39/1020/0001
JP1	HEADER 4WAY STRAIGHT LCK	35/2505/0004
P1	6.35mm QC TAB VERT PCB M	35/0635/0001
P2	6.35mm QC TAB VERT PCB M	35/0635/0001
P3	CON 25 D MALE WIRE WRAP	35/5031/025M
P4	6.35mm QC TAB VERT PCB M	35/0635/0001
PWR1	CON IEC PWR PNL MTG	35/8001/0001
Q1	TRSTR PNP 50A 60V 2N5684	27/2010/5684
Q2	TRSTR PNP 50A 60V 2N5684	27/2010/5684
Q3	TRSTR GP NPN 2N3904 TO92	27/2020/3904
Q4	TRSTR PNP TIP32	27/2010/TP32
Q5	TRSTR NPN MFJ31C	27/2010/F31C
Q6	FET NJ 2N5459 TO92M	27/2030/5459
Q7	TRSTR GP PNP 2N3906 TO92	27/2010/3906
Q8	TRSTR GP PNP 2N3906 TO92	27/2010/3906
R1	RES 180 5% 0.25W AXIAL	51/1040/0180
R2	RES 680 5% 0.25W AXIAL	51/1040/0680
R3	RES 1K0 5% 0.25W AXIAL	51/1040/01K0
R5	RES 150 5% 0.25W AXIAL	51/1040/0150
R6	RES 0.1 5% 10W ASW 10	51/0010/00R1
R7	RES 0.1 5% 10W ASW 10	51/0010/00R1
R8	RES 68 5% 0.25W AXIAL	51/1040/0068
R9	RES 68 5% 0.25W AXIAL	51/1040/0068
R10	RES 39 5% 0.25W AXIAL	51/1040/0039
R11	RES 1R0 5% 0.25W AXIAL	51/1040/01R0
R12	RES 100 5% 0.25W AXIAL	51/1040/0100
R13	RES 180 5% 0.25W AXIAL	51/1040/0180
R14	RES 1K0 5% 0.25W AXIAL	51/1040/01K0
R15	RES 1K5 5% 0.25W AXIAL	51/1040/01K5
R16	RES 1K0 5% 0.25W AXIAL	51/1040/01K0
R22	RES 1K0 5% 0.25W AXIAL	51/1040/01K0
R25	RES 15K 5% 0.25W AXIAL	51/1040/015K
R26	RES 1K0 5% 0.25W AXIAL	51/1040/01K0
RT1	THERMISTOR 110 DEG.	54/0400/0110
RT2	NTC TH'ISTR 10 OHM 7.5A	54/0500/0010
RV1	TRIMPOT 1K 1 TURN VERT	53/1020/01K0
S1	SWITCH SPST MAINS ROCKER	31/9001/0001
T1	PWR TRANS 240V/2x15Vx18A	37/9001/0240

Mechanical Parts for PS12

SCREW M4x10 PNHD PD BZNK	70/M425/0010
SCREW M4x15 PNHD PD BZNK	70/M425/0015
WSHR M4 FLAT STEEL BZNK	71/M415/0001
WSHR M4 SHKPRF STEEL BZN	71/M425/0001
TOP PANEL, POWER SUPPLY	80/9148/0001
BOT PANEL, POWER SUPPLY	80/9149/0001
REAR PANEL, POWER SUPPLY	80/9151/0001
FRONT SUB-PANEL, PWR SUP	80/9150/0001
FRONT PANEL, POWER SUPPL	80/9133/0001
LABEL PWR SUP FRONT	81/9108/0001
COVER PLAIN MODULE	80/9101/0001
HANDLE 3.0	76/0002/300B
HANDLE FERRULE .156 BLK	76/0003/156B
SCREW 4-40x6 CSK PD BZNK	70/4415/0006
SPACER M3x10 M-F	73/M3SP/H010
SCREW M3x6 CSK PD BZNK	70/M315/0006
NUT M3 STEEL BZNK	72/M315/0001
WSHR M3 SHKPRF STEEL BZN	71/M325/0001
SCREW M3x6 PNHD PD BZNK	70/M325/0006
WIRE 50x.25 T/C PVC BLK	36/50X2/BL
QC 6.35 F CRMP 1.5-2.5mm	35/1635/000
EYE TERM M4 CRMP 1.5-2.5	35/4125/0001
WIRE 50x.25 T/C PVC RED	36/50X2/RED
QC 6.35 F CRMP 1.5-2.5mm	35/1635/0001
EYE TERM M4 CRMP 1.5-2.5	35/4125/0001
GND LUG M3 UTILUX H254	39/M301/H254
SCREW M3x10 CSK PD BZNK	70/M315/0010
WIRE 24x.2 250V GREEN/YE	36/24X2/G-Y
WIRE 24x.2 250V BLUE	36/24X2/BLU
WIRE 24X.2 250V BROWN	36/24X2/BRN
HEADER 4WAY STRAIGHT LCK	35/2505/0004
WIRE 7x.2 T/C PVC INS BR	36/7X2P/BRN
WIRE 7x.2 T/C PVC INS RE	36/7X2P/RED
WIRE 7x.2 T/C PVC INS OR	36/7X2P/ORG
WIRE 7x.2 T/C PVC INS YE	36/7X2P/YEL
TERMINAL FOR 4WAY HOUSIN	35/2507/0001
PCB, PWR SUP REGULATOR	30/9108/0001
SPACER M3x15 F-F	73/M3SP/F015
SCREW M3x6 PNHD PD BZNK	70/M325/0006
WSHR M3 SHKPRF STEEL BZN	71/M325/0001
SCREW M3x15 PNHD PD BZNK	70/M325/0015
NUT M3 STEEL BZNK	72/M315/0001
SCREW M3x6 TT PNHD PD BZ	70/M355/0006
MICA INS FOR TO3 TRSTR	74/1000/TO3
WASHER FOR TO220 MOUNTIN	74/1001/T220
ANGLE, P/S HEAT SINK	80/9157/0001
IEC PWR CBL 2M AUST PLUG	36/IEC2/AUS
HEATSINK, POWER SUPPLY	80/9163/0001
PAWL LATCH DZUS DP109SAC	76/0001/0001
INS SLEEVE, F.GLASS 1mm	91/1010/BLK
QC 6.35 F CRIMP .5-1.5	35/3560/0001